

CLAIMS

1. A method of operating a fuel reformer, the method comprising the steps of:
advancing a first air/fuel mixture having a first air-to-fuel ratio into the
5 fuel reformer,
determining if a soot purge is to be performed and generating a purge-soot signal in response thereto, and
advancing a second air/fuel mixture having a second air-to-fuel ratio
into the fuel reformer in response to generation of the purge-soot signal, wherein the
10 second air-to-fuel ratio is greater than the first air-to-fuel ratio.
2. The method of 1, wherein the determining step comprises the step of sensing the amount of soot within the fuel reformer.
- 15 3. The method of claim 2, wherein the sensing step includes the step of generating a soot accumulation control signal when the amount of soot within the reformer reaches a predetermined accumulation level, and wherein the step of advancing the second air/fuel mixture includes advancing the second air/fuel mixture in response to generation of the soot accumulation control signal.
- 20 4. The method of claim 1, wherein the step of advancing the second air/fuel mixture includes advancing the second air/fuel mixture for a predetermined period of time to purge the fuel reformer of soot.
- 25 5. The method of claim 1, wherein the second air/fuel mixture is substantially devoid of fuel.

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6. The method of claim 1, wherein the second air/fuel mixture is devoid of fuel.

7. The method of claim 1, wherein the determining step comprises
5 determining if a predetermined period of time has elapsed since the fuel reformer was last purged of soot and generating a time-lapsed control signal in response thereto, and the step of advancing the second air/fuel mixture comprises advancing the second air/fuel mixture in response to generation of the time-lapsed control signal.

10 8. The method of claim 1, further comprising the step of advancing a third air/fuel mixture having the first air-to-fuel ratio into the fuel reformer subsequent to the step of advancing the second air/fuel mixture.

9. The method of claim 1, wherein the determining step comprises
15 detecting a reformer shutdown request control signal, and the step of advancing the second air/fuel mixture comprises advancing the second air/fuel mixture in response to detection of the reformer shutdown request control signal.

10. The method of claim 1, wherein the determining step comprises
20 generating a high-load control signal when an engine associated with the fuel reformer experiences a high load condition, and the step of advancing the second air/fuel mixture comprises advancing the second air/fuel mixture in response to generation of the high-load control signal.

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11. A fuel reformer assembly for producing reformat gas, the fuel reformer assembly comprising:

a fuel reformer having an air/fuel input assembly, and

a reformer controller electrically coupled to the air/fuel input assembly,

5 the controller comprising (i) a processing unit, and (ii) a memory unit electrically coupled to the processing unit, the memory unit having stored therein a plurality of instructions which, when executed by the processing unit, causes the processing unit to:

operate the air/fuel input assembly so as to advance a first air/fuel
10 mixture with a first air-to-fuel ratio into the fuel reformer,

determine if a soot purge is to be performed and generate a purge-soot signal in response thereto, and

operate the air/fuel input assembly so as to advance a second air/fuel mixture having a second air-to-fuel ratio greater than the first air-to-fuel ratio into the
15 fuel reformer.

12. The fuel reformer assembly of claim 11, wherein the air/fuel input assembly comprises a fuel injector, and the reformer controller is electrically coupled to the fuel injector.

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13. The fuel reformer assembly of claim 11, wherein the air/fuel input assembly comprises an electrically-operated air inlet valve, and the reformer controller is electrically coupled to the air inlet valve.

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14. The fuel reformer assembly of 11, further including a sensor to sense the amount of soot within the fuel reformer, and wherein the plurality of instructions, when executed by the processing unit, further causes the processing unit to (i) generate a soot-content control signal when the amount of soot particulate
5 accumulation within the fuel reformer reaches a predetermined level, and (ii) operate the air/fuel input assembly to advance the second air/fuel mixture in response to generation of the soot-content control signal.

15. The fuel reformer assembly of claim 11, wherein the plurality
10 of instructions, when executed by the processing unit, further causes the processing unit to (i) determine when a predetermined period of time has elapsed since soot was last purged from the fuel reformer, and generate a time-lapsed control signal in response thereto, and (ii) operate a the air/fuel input assembly to advance the second air/fuel mixture in response to generation of the time-lapsed control signal.

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16. The fuel reformer assembly of claim 11, wherein the fuel reformer comprises a plasma fuel reformer.

17. A method of operating a fuel reformer comprising the step of:
20 advancing air in the absence of fuel into a housing of the fuel reformer so as to combust soot present therein.

18. The method of claim 17, further including the step of:
advancing a mixture of fuel and air into the fuel reformer housing prior
25 to the step of advancing air in the absence of fuel into the fuel reformer housing.

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19. The method of claim 17, wherein the advancing step includes
ceasing operation of a fuel injector.

20. The method of claim 17, wherein the advancing step is
5 performed at predetermined time intervals.

21. The method of claim 17, further including the step of
advancing air in the presence of fuel into the fuel reformer housing subsequent to
completion of the step of advancing air in the absence of fuel.
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22. The method of claim 17, further comprising the step of
determining the amount of soot within the fuel reformer housing, and wherein the
advancing step includes advancing air in the absence of fuel if the amount of soot
within the fuel reformer housing is greater than or equal to a predetermined amount.
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23. The method of claim 17, further comprising the step of
determining if a predetermined period of time has elapsed since soot was last purged
from the fuel reformer, and wherein the advancing step includes advancing air in the
absence of fuel when the predetermined period of time has lapsed.